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ABSTRACT

Educational Information Centers are defined as those encompassing a broad range of search, retrieval, and dissemination activities aimed at providing both increased and more effective communication of results of research and development in the educational field to local educational decision makers and practitioners. Evaluation issues are approached in light of these components: user needs, information resources (data bases), question negotiation (search and retrieval), impact and utilization, and cost effectiveness. Centers referred to herein are characterized by predominant reliance on the ERIC (Educational Resources Information Center) data base, supplemented by locally acquired additional materials; formalized interface procedures with their clientele; and a decided user-oriented product concept wherein the emphasis is on the user community developing the questions and the information service providing responses thereto. A chart illustrating a number of centers and the subject of their evaluation questions and the R. I. S. E. (research and information services for education) information center evaluation form with questions ranging from topical coverage on the product to service concerns, client usage, and knowledge of the service are included. (RC)

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THE EVALUATION OF EDUCATIONAL INFORMATION CENTERS

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Carolyn V. Trohoski

Educational information centers are a relatively new phenomenon in the burgeoning area of support services for basic education. Visonhaler and Moon (1973), in a recent ASIS Annual, identified types of educational information centers:

> There are two major types of educational information centers: Literature Clearinghouses, and Instructional Materials Centers. Presently, hundreds of information centers are in operation. The extent and diversity of such centers is described in various directories such as those by Wanger (1972) and Kruzas & Schnitzer (1971).

Excluding the Instructional Materials Centers, a review of the above-cited directories would not reveal the 125 or more agencies engaged in computerized bibliographic searching of the Educational Resources Information Center (ERIC) data base, as reported most recently by Embry (1974). Lancaster (1968), in defining information retrieval activities in a broader context, posits some useful distinctions:

Information retrieval is the term conventionally, though somewhat inaccurately, applied to the type of activity discussed in this paper. An *information retrieval system* does not inform (i.e., change the knowledge of) the user on the subject of his inquiry. It merely informs him on the existence (or nonexistence) and whereabouts of documents relating to his request.

An information retrieval system may retrieve complete texts of documents, document surrogates (such as abstracts), or names and addresses of documents (i.e., full bibliographic citations). A system that ultimately provides the user with full document texts is properly called a *document retrieval system*, whereas a system that presents only citations is a *reference retrieval system*. A retrieval system usually operates in several stages (e.g., its first output may be in the form of citations from which the requester can make a selection). Subsequently, the requester can ask that the complete texts of these selected items be presented. Alternatively, the sequence of responses may be (a) document numbers, (b) citations, and (c) full texts.

Even this delineation fails to encompass the dissemination activities of state departments of education, as revealed in Cutter's (1974) recent review of the education information activities of nine state education agencies.

The definition of an education information center, as it is used in the context of this paper, is one that encompasses a broad range of search, retrieval, and dissemination activities aimed at providing both increased and more effective communication of the results of research and development in the educational field to local educational decision makers and practitioners.

An early pioneer of this type was the MOREL-RIS information project, an outgrowth of one of the regional ESEA Title IV Research Laboratories, which originated many of the service concepts that have become common to an educational information center (Grimes, 1969). ESEA Title III funds provided the seed money for the establishment of a number of the other early information centers followed by the provision of monies for the support of information centers (Lancaster, 1968) serving the vocational-technical education community under Research Coordinating Units. Likewise, the Bureau of Educationally Handicapped funding for special education information centers came as a result of Title VI of the ESEA. It was only in the very late sixties and the early seventies that the National Center for Educational Communication under the leadership of Dr. Lee Burchinal and Tom Clemens began to support the notion of "comprehensive, one-stop educational information centers."

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At last count, some 25 such fully developed information centers existed nationally, many supported by a combination of state and federal funds supplemented by service fees. This paper is not an attempt to be descriptive of all agencies that have adopted the nomenclature of educational information centers. Though there are great differences in clientele, sources of funding, nature of services, geographical service area, and philosophy of operation, the educational information centers referred to herein are characterized by reliance on a predominant data base, (ERIC), supplemented by locally acquired additional materials; formalized interface procedures with their clientele, usually through linkage agents or some process of negotiating inquiries; and a decided user-oriented product concept wherein the emphasis is on the user community developing the questions and the information service providing responses thereto. While a number of the existing centers do provide a selective dissemination of information (SDI) and some *broadcast* dissemination activities, it is in the *responsive* information service components that the greatest challenges relating to evaluation and the greatest potential for impact on the quality of education reside.

What follows, then, is a brief summary of some of the issues that exist in the evaluation of educational information centers and an explanation of existing evaluation strategies and a call for more rigorous analysis and evaluation of the services and the impact of these centers. It should be made clear, however, that no completely common definition of an educational information center presently exists; thus comparative data as a basis for evaluation is at present unobtainable. This paper does not defend what exists as the most ideal but deals instead with that which is workable and operational given the present state-of-the-art. One other limiting characteristic of information centers and, therefore, of their evaluation is that, in most cases, they are but one of a large number of factors that impact on the decision making and programming of local school district operations. Therefore, the state of affairs presently reveals that the information center has little, if any, control over the other variables that may impact upon utilization of its services, i.e., political, socioeconomic, and other context factors.

Nevertheless, educational information centers, regardless of their sophistication, have an important if elusive role in the improvement of education. As suggested by a recent New York State Education Department document on the value of educational information systems:

> Certainly the most beneficial improvements in education or in any field come about through the deliberate study of alternatives. Rarely can alternatives (ideas, techniques or programs) be fully adopted in a unique setting. Rather, they must be adapted to suit personal administrative, organizational or demographic idiosyncrasies.
>
> Regardless of the degree or nature of adaptation required, *there must be an efficient means for originally identifying relevant alternatives, be they curriculum materials or total programs.* Without such a means we generally devise costly "add ons" or recreate the work accomplished totally or in part by others. In short, deliberate, meaningful educational improvement is impossible without such means for alternative identification. [Benson, quoted in preface to Reiner (1974)].

A signal activity, then, of educational information centers is their capacity to provide information about alternatives and supporting information for the process of adaptating or adopting such alternatives. It is our contention that evaluation of the educational information center must proceed from this premise. In counterpoint to this purpose of supporting the planned change or improvement of education is the simple role of service (providing information in response to a question). This dichotomy of purpose may prove dialectical—i.e., future educational information centers may need to fulfill both roles. Evaluation of education information centers has hinged on this dual role vis-a-vis the outcome of their functioning.

While any discussion of the components of an educational information center is arbitrary, we have decided to approach the evaluation issues in light of these components:

1. User needs
2. Information resources (data bases)
3. Question negotiation (search and retrieval)
4. Impact and utilization
5. Cost effectiveness

User Needs

The degree to which user-needs studies relate to the evaluation of information centers is directly related to the style of the center in regard to providing broadcast or SDI services as opposed to responsive services. It is logical that a center that concentrates on responsive services, in effect, conducts the user-needs study at the time it negotiates the query with each individual client. Nevertheless, user-needs studies have had a general value in that they have provided a focus for data base acquisition considerations and, to some degree, the format of information most preferred by various clienteles. Thus, the user-needs study may provide the criterion against which a given information center's data base holdings may be judged. At the national level, the federal government has been responsible for at least one model development for an educational information user-needs study (Paisley, 1972). A second data base requirements study is under way at the present time under contract to the National Institute of Education. These efforts have

indirectly been focused on the evaluation of what exists, particularly in relation to ERIC and its subsystems. Because all of the educational information centers rely heavily on ERIC, the implications of these evaluations are significant. In the prior study, the methodology was also utilized by individual states/information centers.

Existing information centers have done some user-needs analyses on their own; one inference of these studies has been that neither information topic nor format seem to distribute in any predictable way across role types in the educational field—e.g., if open space elementary education is "high interest," this interest applies to guidance counselors, central administrative staff, principals, classroom teachers, and instructional support personnel. Likewise, if a recent state mandate has required the provision by local districts of a plan to handle confidentiality issues in regard to pupil personnel records, *model plans*, manuals, and "how-to-do-it" strategies are in demand regardless of the role status of the local district personnel designated to produce a response to the state mandate. More vigorous evaluation of this phenomena will, of course, provide needed insights into the design of SDI services. While constantly improving, the planning capacity of practitioners still suggests a "firehouse" response to local district problems with the result that current user-needs studies seldom have particular value in predicting future information needs. As a result, many information centers have supplemented their user-needs study with conscious efforts to monitor federal and state trends in programmatic thrusts, futurism activities such as Delphi analysis, recommendations of education reform commissions, and the monitoring of conference proceedings. Another technique that information centers use to anticipate potential information needs is the comprehensive acquisition of organizational and special-interest group newsletters from the national level: Conscientious review of such newsletters as well as announcements of research and development awards by various funding agencies helps centers maintain a position at least one jump ahead of their clients in regard to potential sources of new information.

In summary, *user needs* as an aspect of the evaluation of the information center is limited except that a broad-based user-needs study may suggest categories of information desired by present nonusers and may provide gross measures of the adequacy of information resources.

Information Resources (Data Bases)

For most educational information centers, the main and most commonly searched data base is ERIC. Subfiles of ERIC such as AIM and ARM, the compilations from the Vocational and Technical Education Information Center at Ohio State University, and the EC collection from the Council for Exceptional Children form a secondary resource for information center personnel. Several hundred indexing and abstracting resources and journals in the educational field keep the literature searcher abreast of the latest written materials.

Evaluations of the ERIC system are fed back to Central ERIC through personal communications and semiannual conferences of data base users. Educational information center personnel conscientiously provide this type of feedback, raise questions about the ERIC system, work to improve it through such methods as the Vocabulary Review Panel, provide material for its acquisition function, and have continuously supported this nationalized resource.

A technique implemented to rate other resources of an information center is the citation count. A manual counting of the bibliographic citations of journals and indexes found in completed searches will yield the number of times a particular resource has been utilized. Results of this count may be used in decisions for subscribing or reordering specific materials. A more informal evaluation of the journals may be through staff discussions or individual preferences expressed to the acquisition component of the center.

When self-developed or new data bases are considered for the information resources of a center, the criteria for adoption are a *supplement* not a supplanting of materials to the ERIC system, a *compatible format* such as descriptor assignment to documents, and a *machine* readable data base for ease in searching. Some facilities have their own resources indexed in ERIC terms. Examples of these are Research and Information Services for Education (R.I.S.E.) and the Educational Resource Center of Montgomery County, Maryland, Schools.

Question Negotiation (Search and Retrieval)

Although the question of what constitutes a search may never be fully determined, the literature search function has basic processes; commonalities of practice may be observed from center to center (see Figure 1). Each facility, however, will differ in its information resources, its reliance on manual and/or computer searching, and the constraints under which it operates, i.e.—its charter sponsor, department of education, etc.

Evaluation issues addressed in the search and retrieval operations of a center are those of information resources, literature search and support staff such as the library, and internal feedback mechanisms on the search operations and the products. In regard to information resources, a center must determine, within its dollar considerations and facility situation, whether to contract with one or both of the two large computer service systems to broaden their searching capacity by access to four or five major educational data bases on line. Several

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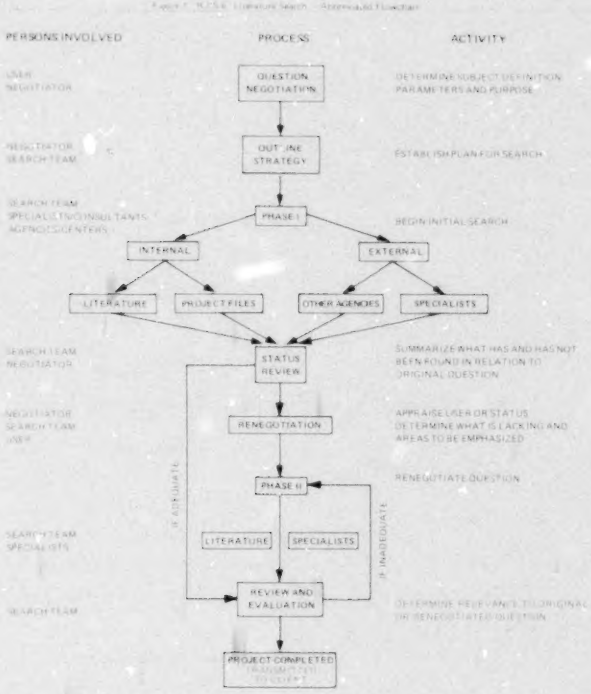


information centers with on-site computers have access to their own specific collections as well. An analysis of these centers illustrates a variety of products as well as capabilities. When users evaluate the service of a center, it is specific to that center since users do not usually contact more than one center for information needs. In time, a comparison of center to center may occur as more service facilities with open search policies, which allow clients from outside a specific geographic area or clientele group to request service, move into a circumscribed locale.

Staff evaluation has been concerned with performance in negotiating questions and conducting searches of the literature. An area that needs more investigation is the training of the personnel who perform these functions. It should be noted that until recently, very few resources addressed the training of searchers or support personnel. Reference librarians have observed that while theory on the topics of question negotiation and searching is available, little if any, preservice simulations or hands-on activities are presently conducted. On-the-job training, an apprenticeship of sorts, has been the only way to gain this type of experience. As a result, searching often suffered from trial and error tactics to gain information. As clients become more sophisticated in their usage of the service, unskilled efforts will not be tolerated.

Another issue for consideration in staff evaluation is how much time and effort should be placed on the review of a product by supervisory staff before it is sent to the client. Constraints of a small staff and high demand for information may cause a center to forego this type of review. At others it may be a mandated procedure.

Internal mechanisms for rating the efficiency of search and retrieval operations are based on the premise that the data base that yields the most relevant information in the least amount of search time is the one to investigate first. This cannot always be predetermined, but familiarity and experience with the resources aids in constructing a resource attack strategy. A technique used by R.I.S.E. is to require the literature searcher to report, on a search strategy work sheet housed in the final product, the usefulness of each data base, indexing and abstracting resource, and outside agency used in researching the topic. This evaluation is considered when the information packet, the search, is updated at a later time.

Another form of process evaluation on retrieval may be conducted by an outside consultant with expertise in a particular field. This expert may be called in to review a series of information packets for *content* comprehensiveness and quality of material. He or she may also suggest deletions or inclusions of certain material and may be acquainted with human resources and authorities not published in journals indexed by the major systems. The expert's evaluation should be confined to the items above and not applied to the appropriateness of the material to the client. This determination is best made by the searcher in conjunction with a competent negotiator.

Because the tendency on the part of the client is to rate only the actual product received, some often reply "I didn't get much material on this question," not considering the time and effort it took to retrieve the information they did get. Rarely does the reply come back, even with weighty tomes of material, "I received too much information on the topic." It seems difficult to convince the user that the center is providing a service, not guaranteeing reams of information on a topic. Most educational information centers have designed or borrowed from others those elements of a service evaluation that best fit their particular situations and forms of output. Questions on the evaluation form (which in some cases accompanies the product while in others follows the packet by a time-delay period of six weeks) channel the client to rate not only the content materials but also the service features of the center. A chart illustrating a number of centers and the subject of their evaluation questions is found in Figure 2. Figure 3 depicts the R.I.S.E. information center evaluation form, last revised in 1970, which has questions ranging from topical coverage on the product to service concerns, client usage, and knowledge of the service.

The evaluation form asks for identification and role information; anonymity is not desired here since replies on the evaluation may warrant a reworking of the search strategy or inclusion of additional material to satisfy a user query.

Figure 2

	Overall assistance of consultant	Ease of specification of topic	Topic coverage	Usefulness of information service of profession	Type of output requested	Usefulness of medium provided	Amount of material provided	Timeliness of service	Purpose of request	Usage of information	Circulation of information	Critical comments	Cost question	Repeat [illegible]ge
TIS		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
RI - EIC	✓	✓	✓	✓			✓	✓	*	*	✓	✓	*	✓
INFORMS			✓	✓	✓							✓	✓	
RISE		✓	✓	✓			✓	✓	✓	✓		✓		✓
F ERIC		✓	✓	✓	✓			✓	✓	✓		✓		
TENN RCU		✓	✓	✓	✓			✓	✓	✓		✓		
ACES		✓	✓	✓			✓	✓	✓	✓		✓		✓
NY EPSIS			✓		✓	✓	✓	✓	✓	✓				✓
NIE - ERC		✓	✓	✓			✓	✓	✓	✓		✓		✓

* Random selection of users - impact assessment

TIS - Texas Information Service
RI - EIC - Rhode Island - Educational Information Center
INFORMS - Iowa Network for Obtaining Resource Materials for Schools
RISE - Research and Information Services for Education (Pennsylvania)
F ERIC - Florida Educational Resources Information Center
TENN RCU - Tennessee Research Coordinating Unit
ACES - Area Cooperative Educational Services (Connecticut)
NY EPSIS - New York Educational Programs and Studies Information Service
NIE - ERC - National Institute of Education - Educational Reference Center

Figure 3. Literature Search Evaluation

RISE

RESEARCH AND INFORMATION SERVICES FOR EDUCATION
198 ALLENDALE ROAD KING OF PRUSSIA, PA. 19406

Search #_____

NAME: _____

POSITION _____

SCHOOL OR INSTITUTION _____

SEARCH TITLE _____

Directions: Check only one alternative for each question. Most of the questions allow you to check one of five alternatives from "very good" to "negligible". Please return in the enclosed self-addressed envelope at your earliest convenience.

	VERY GOOD	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	NEGLIGIBLE
1. To what extent did you find it easy to specify your topic with the person handling your request?	☐	☐	☐	☐	☐
2. To what extent was your topic adequately covered by the R.I.S.E. information package?	☐	☐	☐	☐	☐
3. To what extent did the information sent by R.I.S.E. increase your understanding of the requested topic?	☐	☐	☐	☐	☐
4. To what extent do you consider the literature searching service (in general) of R.I.S.E. to be useful for your professional functioning?	☐	☐	☐	☐	☐

5. Which part of the information package do you consider most valuable?

☐ copies of documents ☐ R.I.S.E. bibliography

6. You would rate the copies of documents that were sent to you as:

☐ too technical
☐ technical, but useful
☐ well-balanced between technical and non-technical
☐ non-technical, but useful
☐ too non-technical

7. The information sent to you arrived:

- ☐ much earlier than expected
- ☐ slightly earlier than expected
- ☐ in time for your purposes
- ☐ late but still useful
- ☐ too late for your purposes

8. Your original intent (check only the single most pertinent intent) for the information package was:

- ☐ making a decision concerning an educational issue
- ☐ planning a program that currently is not available
- ☐ modifying or improving a program that currently exists
- ☐ increasing professional background knowledge about a topic
- ☐ other (please specify) _____

9. Do you think you could have done as good a literature search as the one received from R.I.S.E. if given ample time?

☐ yes ☐ no

10. Did you look up any of the citations on the bibliography for which no copies of the document were provided?

☐ yes ☐ no

11. What part of the literature search would you have done alone if the service had not been available from R.I.S.E.?

- ☐ all
- ☐ most
- ☐ some
- ☐ little
- ☐ none

12. After receiving the R.I.S.E. information package, how was it actually used (please use other side if necessary)?

_____

_____

13. What general comments, criticisms, suggestions, etc., can you offer about the literature search (please use other side if necessary)?

_____

_____

14. How did you find out about the services of R.I.S.E.?

- ☐ newsletter
- ☐ newspaper
- ☐ in-service
- ☐ RUS
- ☐ R.I.S.E. brochure
- ☐ R.I.S.E. clients
- ☐ other means (specify)____

_____

THANK YOU FOR YOUR COOPERATION. WE WILL USE YOUR FEEDBACK TO IMPROVE THE SERVICES OF R.I.S.E.

The user is then asked a series of four questions for which he or she is to choose only one answer on a Likert-type scale ranging from very good to negligible. The first question in the series relates to the negotiation of the client's problem or need area and reflects the expertise of the center personnel in making the client feel comfortable and at ease while probing to find out what the client is really seeking. In cases where extension agents or intermediaries are used for the negotiation portion of the service, the answers to this question provide feedback on the performance of these individuals.

Question 2 requests a response on the data base as well as service. The topic may be inadequately covered because no such information exists, or it may be that the searcher used a faulty strategy or failed to investigate the right sources. Clients often assume that, because they have questions, an answer resides somewhere. However, it may not reside where it can be accessed or retrieved. As satisfied clients become more sophisticated, in repeat uses of the service, their questions are better defined and their expectations are more reasonable.

The third query on the form refers to the amount of new information received by the client through the product. Many will note that their understanding was not increased by the effort, but they were satisfied with the information because it reinforced a position or stand they could then justify to a decision-making body. An example might be the introduction of a language-experience approach to reading in the curriculum because student attitudes toward reading change more positively. The client may have been aware of both the program and the change in student attitude but needed the literature to persuade the school district to adopt the concept.

The last question in this series seeks to determine the client's attitude regarding the value of information services in general. Even in cases where the client was dissatisfied with the specific output, his or her positive answer indicates improved information-seeking behavior through forced-choice responses.

In the second series of questions, the client is asked to give some detail on the content of the product, a rating of the service, and perceived and actual usage of the materials.

It is often difficult for R.I.S.E. clients to separate the value of the documents from the bibliography. Many insert their own answer: both. Traditionally R.I.S.E. has provided reference and document retrieval. Therefore, it is likely they want the documents. Once served the full course, having only the appetizer would not be sufficient.

The rating of the documents in question 6 is related to the client's background and not necessarily his other role or level of learning. For example, identical copies of a search on "Camping in the Elementary Grades" submitted to a teacher and principal in the same school were rated as *nontechnical, but useful* and *technical, but useful* respectively. Most clients rate the products as well balanced.

The service feature of timeliness is rated in the next question. In question negotiation, a critical date is determined by the client and information center personnel. The literature searcher tries to meet the time demand but may be thwarted by outside resource requests not received in time to meet the client's needs. As clients use the service more, they increase the lead time and are less likely to make "I need it yesterday" demands.

Question 8 begs the intention of the request. Although a single reply is desired, the intention may meet several of the alternative answers. This question is compared with question 12 to see if perceived and actual needs have common ground. It may be that, after the information was received, it was used for an entirely different purpose.

The next series of questions, 9-11, ask the client about his or her own research and retrieval efforts. Many respond that they could do a good search but do not have the luxury of time. For that same reason, many clients do not go beyond the packet to retrieve additional documents. Time and resources are given as reasons many clients would attempt only a small search effort if this type of service were not available.

Questions 12 and 13 often elicit long narratives from the clients explaining their actual use of the product and its dissemination among other staff members. Criticisms and suggestions are often elaborations on questions with single response or forced-choice answers. First-time users have no benchmarks. As clients reuse the service, they compare it with previous experience, and their responses become more critical and constructive.

The last question attempts to find out how the client came to use the service and if it is a repeat usage. Many times a client checks more than one response indicating multiple influences on his or her decision to use the service.

An 80 percent return rate indicates the value of this evaluation strategy to both the client and the information center. After review by the appropriate literature searcher and her supervisor, decisions are made to modify the search or keep it in its present completed status. One copy of the form is placed in the search so subsequent users can see the rating applied by the original requester. A second copy is sent to the linking agent representing the requester's geographic area to provide feedback on his or her role as negotiator (question 1) and to provide the agent with an overall evaluation of R.I.S.E. services.

The evaluation form in Figure 3 is sent only to clients requesting a comprehensive literature search. Figure 4 illustrates the evaluation form sent to recipients of a computer-generated bibliography—a quick, superficial

Figure 4. An Evaluation Form Sent to Recipients of a Computer-Generated Bibliography

EVALUATION/DIALOG BIB #DGB____-___

1. Did the computer bibliography cover the topic requested?
   ☐ yes ☐ no comment _____

2. Was the turnaround time satisfactory?
   ☐ yes ☐ no comment _____

3. Did you retrieve any items from the bibliography?
   ☐ yes ☐ no

4. Would a bibliography of 10 citations/abstracts have satisfied your request?
   ☐ yes ☐ no

5. How do you feel about the costs of the service?
   ☐ reasonable ☐ unreasonable _____

6. Do you plan to use the service again?
   ☐ yes ☐ no comments _____

_____

search of one or two data bases with no relevance judgments made on the maximum output of 100 citations or abstracts. While these evaluation forms may not be fully representative, they provide an example of the current strategy for product/service evaluation.

Impact and Utilization

While information centers, especially those operating in a responsive mode, tend to represent the "pull" dissemination approach rather than the "push," external funding and related accountability issues raise the evaluation spectre of measuring *impact*. What effect does an information center and its service have upon what happens to students in the classrooms of local school districts? As with most indirect resource allocations, the impact of information and its utilization raises very difficult issues of evaluation strategy. Furthermore, the complex factors affecting changes in schools complicate the cause-and-effect evaluation. One might take the position that was recently expressed by a high-level state department of education official commenting on the relative value of state-supported educational information services that school personnel continue in ever expanding numbers to make inquiries, request service, and use the information center is sufficient justification for continued state support. In its follow up evaluation questionnaire of the search product, at least one center has directed inquiries to its users as to the nature and value of the information received with questions such as those shown in Figure 5.

It is difficult to ascertain the precise impact of an information product on decision-making processes and the complex variables that surround a particular educational change. Furthermore, many of the existing centers began and continued their operation as services rather than as change or reform agencies. Indeed, most centers find themselves in a position of having one leg in the change role and one in the service function. Especially with new clients, the information center tends to concentrate on providing information the client wants. If the center is successful, its credibility increases and repeated usage by the client occurs. Furthermore, the client recognizes the value of the service and asks more judgmental questions. While most centers prefer not to select solutions for their users from their available data base, they may provide technical assistance to help clients effectively utilize the information provided.

In planning a yet uncompleted master evaluation of one information center, Taylor (1975) made a distinction

Figure 5. Follow-up Evaluation Questionnaire

1. Describe briefly the actual use you made of the information or assistance provided by the EIC (Educational Information Center).

2. Rate the extent to which the information received figured in solving the problem which caused the request to be initiated.

( )	( )	( )	( )	( )
The information did not play a role in solving the problem.				The information was the major component in the solution of the problem.

If you checked "the information did not play a role in solving the problem," then please try to specify below why this was the case and do not answer any further questions.

____ information was not relevant
____ information did not arrive on time
____ other resources found were more useful
____ the information need no longer exists
____ other _____

Comment:

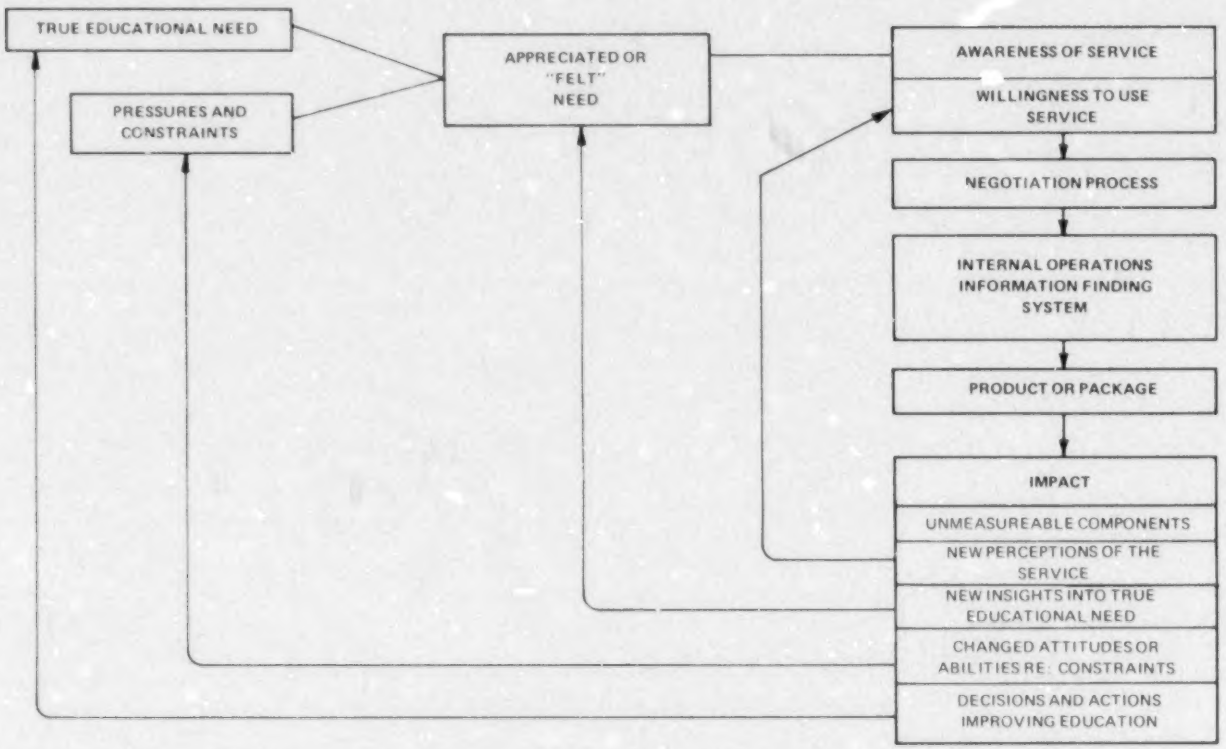
3. (a) Who was affected by the information or assistance you obtained from the EIC? (check those that apply)

____ just myself	____ student(s)	____ don't know
____ teacher(s)	____ supervisor(s)	____ no one
____ principal(s)	____ parent(s)	____ other (specify_____)

(b) If anyone was affected by the information or assistance you obtained from the EIC, estimate the number of persons affected in each category.

____ teacher(s)	____ student(s)	____ parent(s)
____ principal(s)	____ administrator(s)	____ other (specify_____)

Figure 6. Diagrammatic Summary: Master Evaluation of Educational Information Services



between product evaluation and impact evaluation. It was presumed that a structured interview eliciting responses from the client on the impact of the information services provided might have to deal with impact arrayed along five aspects:

1. the aggregate of all unmeasurable components
2. new client perceptions of the information service
3. new client insights into true educational need
4. changed client attitudes or abilities to deal with external and internal pressures and constraints
5. client-initiated decisions and actions which improve education (see Figure 6).

The first aspects that cannot be studied are those immeasurable, unacknowledged, and elusive components of client attitudes and perceptions. Part of the true value of the service may be found in the modification of client personality variables, new perceptions of internal strengths and weaknesses, changed outlook upon role, clearer assessment of personal abilities to cope with the job at hand, and so forth. This aspect of impact may be very important, but it is nevertheless difficult to assess or systematically observe.

The second aspect of impact has to do with new understanding regarding the service and its abilities to help the client. This understanding comes about as a result of having tested or retested the dissemination system. This component is measured by the extent the client is willing to report his changing perceptions to the center and the degree to which clients make repeat requests to the center for information services.

The third component of impact are the new insights the client gains into his true educational needs. Perhaps some aspect of true need, previously unappreciated, is now brought to the front and dealt with as a current or "felt" need.

The fourth component of impact is changed attitude toward, and increased ability to cope with, the internal and external pressures and constraints (e.g., more confidence when dealing with issues within the community). Sometimes a request for information is basically negative; that is, the need is expressed more in terms of coping with a constraint than instituting an effective behavior. Most educational information centers are willing to respond to such requests (e.g., to help educators gain material to resolve board disputes, make presentations to hostile taxpayer groups, and so on).

The fifth and most important component of impact consists of decisions and actions initiated by the client, increasing his effectiveness and ultimately leading to a better education for targeted students. It is, of course,

difficult to establish the relationship between new educational practices and the process by which they were instituted. It cannot be known, for example, the extent to which information caused basic changes in educational practices. However, the user of systematically disseminated information is usually able to assess the extent to which he used such information when attempting to reach decisions or institute actions.

From the provision of direct information services to the client, through, for example, a collection of abstracts or primary documents, a center may move toward provision of human interface services. One then encounters an entirely different kind of evaluation problem. A major thrust of many information centers has been the addition of linker or extension-agent functions. While this paper is too short to include a complete discussion of this adjunct to information centers, it is important to delineate at least two of the evaluation developments which tie these services back into the information function itself. Of greatest significance was the support by the National Center for Educational Communication of USOE (later transferred to the National Institute of Education) of the efforts of three pilot states to establish, maintain, and operate educational information service centers for a three-year period. These efforts included utilization of part-time or full-time linkage agents or extension agents. An extremely valuable evaluation and documentation of the experiences of these three states was completed under the able leadership of Dr. Sam Sieber of Columbia University's Bureau of Applied Social Research. The report, entitled *The Use of Educational Knowledge* (Sieber 1972), analyzes through rather extensive evaluation strategies, key concerns in the development of a comprehensive information service including the area of management, information retrieval, and field-agent functions. It is in the relationship between the latter two elements (information retrieval and the field-agent function) that Sieber's conclusions and inferences are most valuable to the present discussion of the evaluation of information centers. Most important is the transformational role provided in some cases by the linkage agent—that is, the translation of the finished product of the information center into utilitarian knowledge for use by the client. Emphasis is placed on establishing the neutral role of the field agent in this setting rather than the expert pushing a particular solution or product on the user.

Other attempts have been made to measure impact utilization but because of problems such as the subtle application or influence of information, the high degree of information adaptation that takes place, the extreme difficulty in tracing a real communication line, and in the absence of appropriate measures, few studies have truly been able to determine impact. One promising study was developed by Dr. Richard K. Herlig of the Kansas State Department of Education. Dr. Herlig developed instrumentation and measurement techniques to evaluate a comprehensive state education information system utilizing computer search services and affording other services similar to those offered by a majority of the existing information centers. A replication of this study was recently conducted by the New York State Department of Education's Education Programs and Studies Information Service Unit. In summarizing the strategy used, Greg Benson of the New York State Department reports as follows:

> The developmental evaluation techniques which were designed by Herlig to objectively and non-technically measure the impact of project services on schools being served were based, in part, on Rogers' "social systems" model.
>
> Indices were developed which incorporated the theoretical view that receptivity to change is controlled by (1) the relative complexity of the idea (information request); (2) the degree of innovativeness displayed by the individual or group initiating the information request; and (3) the degree of individual variability in the adoption process. (Herlig, 1973).
>
> Working with the above assumption, three variables were delineated by Herlig: complexity, innovativeness, and adoption. These were each viewed as being measurable along a continuum of 1 to 5.
>
> For an effective evaluation, and as replication of the Herlig study in Kansas, it was determined that for this study the three variables be measured (complexity, innovativeness, and adoption) for each search. Complexity and adoption variables were arrived at through personal interview and evaluation form techniques, while innovativeness was determined for each educator or group by means of the LAIN scale (developed by Herlig in 1971).

The results of both studies indicate the positive value of the use of some kind of informational linking agent between the information center itself and the practitioner in the field. Differences between these two studies and the general conclusions reached by Sieber and his group in regard to the pilot states suggest the need for a very careful review of the evaluation methodology and continued focus on the elusive impact outcomes of educational information services.

Cost Effectiveness

While the previous section leaves open issues concerning current capacities of measuring impact of educational information centers, the present accountability syndrome raises the other evaluation related concern: cost effectiveness. Efforts to analyze the value of information services (regardless of the discipline) have been, at best, poorly defined. Furthermore, simple marketplace considerations when complicated by the vagaries of grant or contract funds from federal or state sources have obscured the cost-effective factors. While certain subcomponents of the information center's internal operations

are subject to comparative analysis (e.g., one batch computer search against another type of software system given common hardware requirements), the educational information centers have not proliferated sufficiently to be subject to the natural selection process frequently accorded to the free enterprise system; rather, the development of a one-stop comprehensive educational information center has been the goal of many information center directors. The information center has usually been recreated in a vacuum where there was little or no competition to shape or guide its subsequent development. Cost-effectiveness analysis obviously requires an agreed-upon set of cost factors that can be sifted out of the overall operations of the information center. Weisman has produced one generic guide for determining the cost of information center operation although most Information Analysis Centers (which are the basis for this document) tend to use expensive transformation and synthesis personnel, generally experts in a science-technology field. Educational information centers seldom provide these roles and thus, the benchmarks are not fully relevant. Other costing efforts have been defined by Douglas Price of the Operation Research Corporation (formerly Leasco, a contractor for the ERIC facility over the last several years), but here the emphasis is upon the acquisition side rather than the dissemination side of services. While individual operations can clearly be defined, particularly those that are labor-intensive, or where production can be associated with direct labor and materials cost, it is in the elusive area of data base acquisition and maintenance, developmental activities, and the allocation of overhead costs where cost analysis becomes extremely difficult. One present large-scale effort at cost-effectiveness analysis interestingly does not compare one information center style or philosophy against another but instead defines the information center as a linkage agency among a variety of linkages within the educational domain. This study (in process) is a design for the evaluation of multiple variations of educational linkage programs and is being conducted by the Institute for Communication Research at Stanford University. William Paisley and his colleagues (1973) have designed an interesting analysis model:

> Under a contract from the National Institute of Education, Stanford is conducting a survey of educational "linkage" organizations and is designing an evaluation procedure that can be used for policy planning by such organizations and by NIE.
>
> Educational linkage organizations include state and local information centers, teacher centers, instructional materials centers, school study councils, professional associations, technical assistance programs, college and university education libraries, educational broadcasting for educators, and diverse other facilities and programs.
>
> The linkage evaluation focuses on three factors:
>
> 1. Linkage services, classified generally as retrieval services, publication services, media services, and human (interpersonal) services
> 2. Costs of services, classified generally as labor, materials, and overhead
> 3. Client reactions to services, obtained via mail questionnaires and person interviews

Recommendations and Conclusion

1. Efforts must be made to bring some consistency to the terminology associated with educational information centers, their roles, and their evaluation needs. This task should be carried out in full cognizance of similar efforts emerging from the broader field of information science. The recent establishment of Information Services to the Education Special Interest Group within the American Association of Information Science should assist this effort.
2. The notion of educational information services versus the utilization of educational information in the educational change process must be more fully researched.
3. More systematic efforts must be made to evaluate growing training resources in light of specific operational aspects of the educational information center. Most important are the skills related to query negotiation, search techniques, relevance judgments (recall and precision), and extension agent or other utilization support.
4. While more rigorous evaluation strategies are needed for impact evaluation of information centers, replications of existing studies (such as that of Richard Herlig) at more sites are needed to ascertain their applicability to a wide variety of centers.
5. Existing centers must apply more rigorous program budgeting and cost-analysis techniques in order to provide a management data base from which cost-benefit characteristics can be determined.

In conclusion, it is time to take stock of the current developments in order to guide and assist new system operators in the future. We concur with the commentary of Vinsonhaler and Moon (1973, 21):

> In summary, much development work has taken place during the last five years, together with some evaluation. Many types of applications, such as ERIC, are at stages of development that now lend themselves to further evaluation and improvements based upon this evaluation. The reviewers feel that, in the future, the success of many types of applications will be dependent upon long-term commitments using evaluation, re-analysis of goals, modification of the system, and continued evaluation in a repetitive process.
>
> Further, in coming years the need seems to be less for additional technical developments than for persons capable of relating the existing technical tools to the very human process that is education.

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